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DRAWINGS ATTACHED

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(54) NON-SLIP MOVING WALK TREADBOARD

(71) We, WESTINGHOUSE ELECTRIC CORPORATION of 3 Gateway Center, Pittsburgh, Pennsylvania, United States of America a company organised and existing under the laws of the Commonwealth of Pennsylvania, United States of America do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

The invention relates to load transporting apparatus and more particularly to moving walk treadboards having a cleated load-bearing surface.

Known moving walks are composed of a series of rigid metal platforms having longitudinal cleats and which are connected to form an endless articulated belt. The cleats are provided to ease a load off of the walk at the end of the passenger transporting run through cooperation with combplates. This concept has been used for years on moving stairways. Unlike the moving stairway where the load bearing surface remains horizontal by the formation of steps as the conveyor negotiates an incline, the load bearing surface on the moving walk assumes the slope of the incline which can be as much as 15°. With the cleats normally formed of die cast aluminum, the surface can offer marginal frictional qualities to a passenger on an incline especially on outdoor installations where the moving walk is exposed to rain.

Various arrangements to overcome slip problems have been proposed. One has proposed the formation of a cleat with a non-slip surface by filling the space between two vertical projections on the treadboard of a moving stairway with an "artificial stone" in the plastic state. In order to maintain the hardened filler between the walls of the cleat projections were left on the inner walls of the cleats to lock the "artificial stone" in place.

For safety reasons, the cleats on moving stairways and walks today are made narrower to lessen the chances of pinching objects between the cleats and the combplate at the end of the run. The narrower grooves between the cleats on present-day treadboards also precludes women's high-heels from becoming caught in the treadboard. Many state codes today specify that the pitch of the cleats (the distance between corresponding portions of adjacent cleats cannot exceed one-half inch. With the new narrower cleats, if the projection forming the sides of the cleats are made thick enough to be structurally rigid, there is insufficient space remaining between the side walls for effective filling with "artificial stone" as is taught by U.S. Patent 1,956,153. In fact, even with the wider cleats which would accommodate thicker vertical projections, this 1,956,153 patent acknowledges the problem of structural rigidity by providing for reinforcing ribs between the side walls of the cleats. Furthermore, if the width of the projections is sufficient to give rigidity to the clear a substantial portion of the upper surface of the cleat is still formed by the aluminum which has less than satisfactory slip-resistant qualities.

U.S. Patent No. 3,247,947 proposes coating the entire treadboard with rough wear resistant particles applied by means of a flame spraying process. Although this process solves the problem of providing a non-slip load bearing surface for the narrower cleat, the wear characteristics have been found to be not as satisfactory as is desirable.

The chief object of the present invention is to provide an improved passenger conveyor with improved slip-resistant characteristics for the load bearing surface which presents the maximum non-slip surface consistent with structural rigidity.

The invention resides in a moving walk treadboard comprising a base portion, a plurality of spaced cleats mounted on said base portion, a plurality of said cleats each having raised edges forming a depression in the upper surface thereof, the tops of said raised edges being in a common plane parallel to the base portion thereby forming a load-bearing surface, a core formed in place in the depression between the raised edges of the cleats substantially filling the entire depression

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and composed of a material having a surface possessing a resistance to slip greater than that of said cleats and which permanently bonds itself to the surfaces of the cleats defining said depression, whereby the treadboard is composed of rigid resultant cleats with a load bearing surface formed substantially by said slip-resistant surface of the core.

The invention also resides in a conveyor for carrying load, comprising a structure having a first landing and a second landing horizontally and vertically spaced from the first landing, an articulated belt having a load transporting run and a return run, motive means for moving the belt in a predetermined closed path with said load transporting run including a portion inclined relative to a horizontal plane extending between said landings, wherein said belt comprises an endless series of substantially identical rigid treadboards each having a base portion and a plurality of spaced cleats mounted thereon parallel to the direction of movement of said treadboards, a plurality of said cleats having raised edges forming a depression in the upper surface thereof and a core substantially filling said depression, said core composed of a structurally rigid material with a high coefficient of friction which bonds itself to the surfaces of said cleats defining said depression, the exposed surfaces of the cores of said cleats being in a common plane to form a non-slip load bearing surface.

More specifically, depressions are provided in the upper load bearing surface of the longitudinally oriented treadboard cleats on an endless conveyor composed of a series of flexibly connected rigid pallets or treadboards. The depressions are filled with a composition which hardens in place to form a non-slip load bearing surface and which forms a bond with the walls of the depression to give structural rigidity to the cleats. The core can be composed of a suitable grit to provide the non-slip characteristics and an adhesive binder to act as the bonding agent. The side walls of the depression therefore only need be thick enough to contain and give form to the binder thereby maximizing the non-slip surface area. Furthermore, since the binder bonds to the main body of the cleat, irregular surfaces are not required to lock the filler in place and therefore the depressions only need be deep enough to provide a suitable reserve of the non-slip material for long life. The shallower depressions also preserve most of the inherent structural rigidity of the cleat. By selecting the core material with wear characteristics at least equal to that of the walls of the depression the non-slip surface will be maintained for an appreciable length of time even under prolonged heavy service.

Although the body of the cleat can be constructed of any structurally rigid material including even plastics, the preferred embodiment of the invention utilizes die cast aluminum. The preferred embodiment of the invention also utilizes aluminum oxide particles for the grit and an epoxy resin as the adhesive binder. Preferably the binder bonds to the grit in addition to bonding to the aluminum.

Figure 1 is a side view in elevation, with parts broken away and parts omitted, of a moving walk embodying the invention;

Fig. 2 is a top plan view of a portion of the moving walk illustrated in Fig. 1 with a blowup of a section of the treadboard; and

Fig. 3 is an enlarged isometric view, with parts in section, illustrating details of construction of the treadboards of the moving walk of Fig. 1.

The preferred embodiment of the invention will be described as applied to the moving walk disclosed in U.S. Patent No. 3,191,743. Illustrated in Figure 1 is a moving walk which includes a continuous articulated belt 1 comprising an endless series of substantially identical, generally rectangular rigid platforms or treadboards 3 disposed to be moved along guides or tracks 5, which may be supported by a suitable truss (not shown). The belt 1 has an upper or passenger transporting run extending between a lower landing 7 and an upper landing 9. The passenger or load transporting run comprises a lower horizontal portion A adjacent the lower landing 7, an upper horizontal portion B adjacent the upper landing 9 and a portion C which joins the horizontal portions and which may be inclined at an angle relative to the horizontal of the order of 35°. The belt 1 also has a lower return run D and a pair of arcuate end runs E and F, the latter of which constitute transitions between the passenger transporting and return runs. The belt 1 is driven in the closed path by a motor 59 connected through a gear 47 and drive belt 41 to the upper horizontal portion of the belt B. The drive belt 41 is guided by pulleys 45 which maintain it in the extended position.

Adjacent ones of the platforms 3 are supported in common by a pair of outwardly disposed wheels or rollers 11 which are mounted for rotation about a common axis by means of a pair of longitudinally aligned stub axles 13, respectively, (see Fig. 2). The rollers 11, in turn, are supported by the tracks 5 for guiding the platforms 3 in the desired path. In order to prevent the rollers and their respective associated platforms from rising from the tracks 5 during transition of the belt 1 between its load transporting run lower horizontal portion A and its inclined portion C a relatively short auxiliary upper track section 5a is provided at each side of the belt adjacent the aforesaid transition for engaging the upper portion of the rollers as they pass thereunder; auxiliary upper track section 5b is provided for engaging the upper portions of

the rollers 11 as the platforms pass over the drive belts.

Each platform or treadboard 3 includes a body or base portion 27 which carries a plurality of cleats 29 parallel to each other and to the longitudinal axis of said base and are spaced to form grooves 31 therebetween extending in the direction of movement of the platform. The cleats and grooves of each of the platforms are aligned longitudinally with the cleats and grooves of each of the other platforms. Preferably the cleats 29 extend to a uniform height from the base portions 27. The cleats 29 intermesh at each end of the load bearing run with the teeth of the comb plates 73 as described in detail in the '743 patent.

The dimensions of the treadboard cleats and grooves preferably are such that the loads to be transported by the belt 1 will be supported adequately by the cleats on the top surface thereof. For example, each of the cleats 29 may have a width of the order of 9/32 inch, while each of the grooves 31 may have a width of the order of 7/32 inch, the cleat pitch, therefore, being of the order of one-half inch.

The treadboards are preferably made of die cast aluminum with depressions precast into the cleats. The depressions are defined by the raised edges 30 of the die cast cleats 29. The depressions extend substantially the full width of the upper surface of the cleats 29. Since the invention is shown as being applied to the treadboard disclosed in the 3,191,743 patent the depressions do not extend the entire length of the cleats due to the arcuate end portions of the cleats. However, the depressions do extend substantially the entire length of the portions of the cleats that would be contacted by passengers being transported by the moving walk.

To provide the non-slip surface, the depressions are filled with a core material 32. The core material is formed in place and allowed to harden. In addition to having a high coefficient of friction, the core material should possess structural strength upon hardening. The structural strength can be gained by selecting a core material which will form a permanent bond with the aluminum portion of the cleat. If the entire material bonds to the aluminum, the raised edges of the cleats 30 can be made thinner. On the other hand, if the core material does not bond to the raised edges 30, the edges would tend to spread under the weight of the load. The narrower that these walls can be made the more non-slip surface can be provided for a given cleat width. In fact if the core material possesses satisfactory structural rigidity the walls 30 need only be thick enough to confine the core material 32. Furthermore, if the bond between the core 32 and the aluminum portion of the cleat is sufficient, the depression only has to be deep enough to serve as an adequate reservoir for the non-slip material since the relatively small surface area of the depression will be adequate to lock the core in place. Preferably the raised edges of said cleats parallel to the longitudinal axis is of the order of one-sixteenth inch thick and wherein the height of said raised edges of said cleats is of the order of one-eight to one-quarter inch.

The core material 32 preferably should also possess wear characteristics at least equal to those of the aluminum die casting. Although as shown in Fig. 3 the core material may be applied initially to project about 1/32 inch above the upper surface of the cleats 29, this material will necessarily begin to wear after prolonged use. By providing that the core material has wear characteristics at least as good as the aluminum, when the core wears down it will always be at least as high as the surrounding aluminum.

A suitable composition for the core material is a grit and an adhesive binder such as an epoxy resin. The grit may be composed of small sharp edged particles of a number of hard materials such as aluminum oxide, zinc oxide or carborundum to name only a few. In the preferred embodiment of the invention, aluminum oxide of number 80 grain size is utilized. An epoxy resin such as Resiweld A7091 manufactured by the H. W. Fuller Company and sold under the registered trademark Resiweld may be utilized as the adhesive binder. The American Abrasive Company also supplied a suitable core material composed of 50% aluminum oxide and 50% epoxy resin which is sold under the trade name of Amochum. The binder bonds not only to the aluminum but to the grit.

As previously pointed out the bond characteristics of the core prevents spreading of the thin aluminum walls of the cleat. This is particularly desirable for cleats which coact with the combplates 73 because a spreading cleat may interfere with the teeth of the combplates.

WHAT WE CLAIM IS:—

1. A moving walk treadboard comprising a base portion, a plurality of spaced cleats mounted on said base portion, a plurality of said cleats each having raised edges forming a depression in the upper surface thereof, the tops of said raised edges being in a common plane parallel to the base portion thereby forming a load-bearing surface, a core formed in place in the depression between the raised edges of the cleats substantially filling the entire depression and composed of a material having a surface possessing a resistance to slip greater than that of said cleats and which permanently bonds itself to the surfaces of the cleat defining said depression, whereby the treadboard is composed of rigid resultant cleats with a load bearing surface

formed substantially by said slip-resistant surface of the core.

2. A treadboard according to claim 1 wherein the cleats are parallel to each other and to the longitudinal axis of the base, and wherein the core is essentially composed of a mixture of a grit and an adhesive binder which bonds the grit together and to the walls of the depression in the cleat, said core having wear characteristics at least equal to the wear characteristics of the raised edges of the cleats whereby through continued usage a non-slip load bearing surface for the treadboard is maintained.

3. A treadboard according to claim 1 or 2 wherein said base portion and cleats are composed of an aluminum containing material, wherein said grit includes aluminum oxide particles and wherein said adhesive binder is composed essentially of an epoxy resin.

4. A treadboard according to claim 2 or 3 wherein the pitch of said cleats is no more than one-half inch, wherein the raised edges of said cleats parallel to the longitudinal axis thereof are of the order of one-sixteenth inch thick and wherein the height of said raised edges of said cleats is of the order of one-eighth to one-quarter inch.

5. A conveyor for carrying load, comprising a structure having a first landing and a second landing horizontally and vertically spaced from the first landing, an articulated belt having a load transporting run and a return run, motive means for moving the belt in a predetermined closed path with said load transporting run including a portion inclined relative to a horizontal plane extending between said landings, wherein said belt comprises an endless series of substantially identical rigid treadboards each having a base portion and a plurality of spaced cleats mounted thereon parallel to the direction of movement of said treadboards, a plurality of said cleats having raised edges forming a depression in the upper surface thereof and a core substantially filling said depression, said core composed of a structurally rigid material with a high coefficient of friction which bonds itself to the surfaces of said cleats defining said depression, the exposed surfaces of the cores of said cleats being in a common plane to form a non-slip load bearing surface.

6. A conveyor according to claim 5 wherein the cleats of said treadboards are essentially composed of aluminum and wherein the core is essentially composed of a grit and an epoxy resin binder.

7. A conveyor according to claim 5 or 6 wherein the pitch of said cleats is no more than one-half inch, and wherein the thickness of the raised edge of said cleats parallel to the longitudinal axis thereof is of the order of one-sixteenth inch thick.

8. A conveyor according to claim 5, 6 or 7 wherein a combplate is provided having fingers intermeshed with said cleats for combing load off of said cleats.

9. A treadboard substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

10. A conveyor substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

RONALD VAN BERLYN

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1276513 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

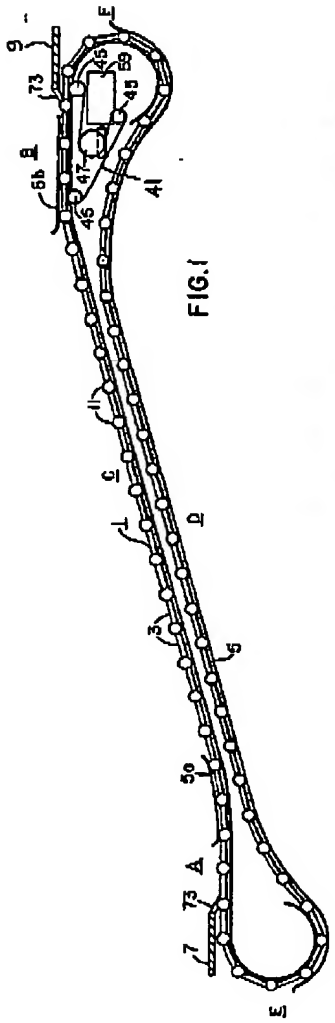

FIG. 1

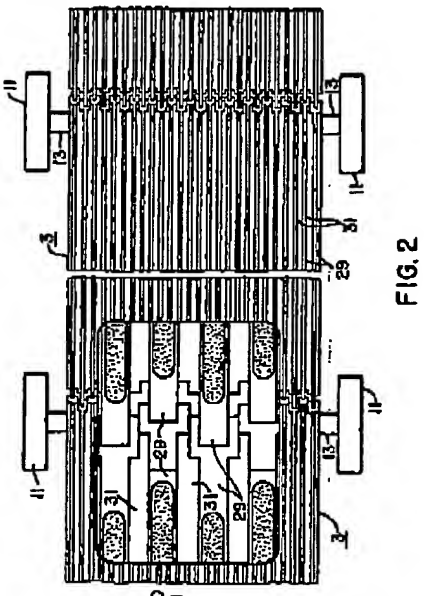

FIG. 2

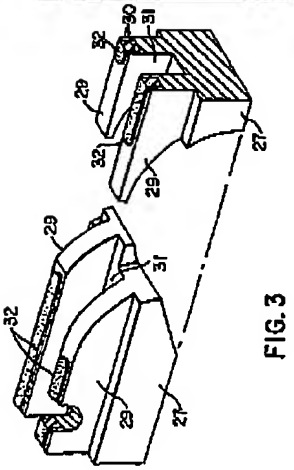

FIG. 3